

Le Chetelier

Name_____

1) Consider the simple equilibrium reaction: $A + A \rightleftharpoons A_2$

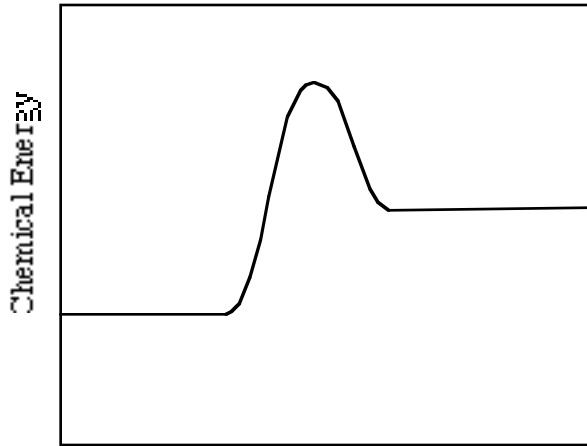
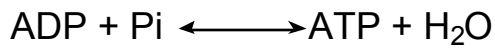
Assuming the reaction is in equilibrium, so that two A's form an A_2 molecule just as fast as an A_2 breaks into two A's, answer the following questions.

a) What happens to the rate of reaction from left to right if you add more A's to the mixture? Explain why in terms of collisions.

b) Le Chetelier's principle states that a chemical reaction in equilibrium will react in such a way as to "stress" that it will counteract the stress and reach a new equilibrium. Assume we add a bunch of A's as mentioned above. According to Le Chetelier's principle, why does it make sense that to come back to equilibrium the reaction will go faster for a while from left to right instead of right to left? We boosted the A concentration so what would Le Chetelier predict will happen as the system comes back to equilibrium?

c) What would happen if we removed some A_2 from the equilibrium system instead? Explain it from both the collision and Le Chetelier perspectives.

2) The energy storage system in our bodies uses ADP and ATP in the following reaction (the terms ADP, ATP, and Pi represent more complex molecules, so don't worry about the balancing of this equation). Imagine that we stress this equilibrium system in several ways.



Describe how the chemical system would react in order to come back to equilibrium (react faster to form more products or react faster to form more reactants), and explain why this would be the response of the chemical equilibrium to that particular stress.

a) More ADP is added to the system.

b) ATP is constantly removed from the system.

c) You become cold (cooling the system) and need to generate heat.